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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/698,964	10/31/2003	Kenneth O. McElrath	3006.001800/KDG	8810

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EXAMINER

WILLIAMS, SHERMANDA L

ART UNIT PAPER NUMBER

1745

DATE MAILED: 09/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/698,964

**Applicant(s)**

MCEL RATH ET AL.

**Examiner**

Shermanda L. Williams

**Art Unit**

1745

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 October 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-62 is/are pending in the application.
- 4a) Of the above claim(s) 18-62 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Claims 18-62 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 9/12/2006.

### ***Information Disclosure Statement***

The information disclosure statement filed 10/31/2003 and 5/23/2005 have been considered by the examiner.

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1,2, and 5,12, 17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Marchetti et al (US 5,277,996). Marchetti et al. discloses a fuel cell electrode and the method of producing the electrode. The electrode is constructed of a carbon material or layer known as fullerene (col. 5 lines 8-15). The fullerene layer is coated with platinum as a catalyst (col. 5 lines 16-25). The fullerene forms a lattice structure or mat (col. 5 lines 20-25). The thickness of the fullerene lattice structure is said to be 200 angstroms (col. 5 lines 35-36). The catalyst layer is 450 angstroms thick (col. 5 lines 36-37). Marchetti

teaches that the thickness of the fullerene layer and the catalyst layer can be varied to optimized performance (col. 5 lines 40-42).

4. In regard to claim 2, the electrode is constructed of a multi-layered or walled carbon structure channel or tube (col.4 lines 52-54; col. 4 line 67- col. 5 line 10).

5. In regards to claims 12 and 17, these are statements of intended use. In claim 12, "...a component in a hydrogen/oxygen proton exchange membrane fuel cell (PEMFC)" has not been given patentable weight. In claim 17, "...a component in a direct methanol fuel cell (DMFC)" has not been given patentable weight. It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetti as applied to claim 1 above, and further in view of Fisher et al. (US 6,203,814). Fisher discloses a method of making functionalized nanotubes. The graphitic nanotubes or fullerenes are functionalized by chemical substitution (see Abstract). Fisher teaches the use of a polycarboxylic acid in the process to functionalize the nanotubes (col. 7 lines 32-41). It would have been obvious to one

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having ordinary skill in the art at the time of the invention to use add a functional such as carboxylic acid to the carbon nanotube structure. The presence of the carboxylic acid aids in linking the nanotubes to form the mat or lattice layout.

8. Claim 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetti as applied to claim 1 above, and further in view of Satoru et al. (JP 08-031444). Satoru discloses an electrochemical cell employing carbon particles (see Abstract). The reference teaches that platinum and other noble metal may be used as the catalyst for the electrode construction. It would have been obvious to one having ordinary skill in the art at the time of the invention to use platinum and ruthenium as the catalyst material to promote the electrochemical reaction with the electrochemical cell.

9. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetti as applied to claim 1 above, and further in view of Hampden-Smith et al. (US 2003/0198849). Hampden-Smith discloses electrocatalyst powders and energy devices using the electrocatalyst powders. The reference teaches the use of homo- and hetero-fullerene and carbon nanotube based material as an active component in the reduction of oxygen (paragraph 109). Hampden-Smith discloses an electrode structure utilizing platinum as the catalyst and having various surface loading values such as of 0.4 mg Pt/cm<sup>2</sup> (paragraph 417), 0.1 mg Pt/cm<sup>2</sup> (paragraph 417), 0.05 mg Pt/cm<sup>2</sup> (paragraph 416). Hampden-Smith does not explicitly teach an electrode with a surface loading of 0.025 mg Pt/cm<sup>2</sup> or 0.010 mg Pt/cm<sup>2</sup>, however the it would have been obvious to one having ordinary skill in the art to use the absolute minimum amount of platinum catalyst necessary for proper cell performance. This decreases the total

amount catalyst required and therefore reduces cell weight. The comparisons discussed in Hampden-Smith evaluate cell performance employing various surface loading values.

10. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetti as applied to claim 1 above, and further in view of Hampden-Smith et al. as discussed above. Hampden-Smith also discloses a membrane electrode assembly (MEA) having a supported active species (platinum electrocatalyst) loading of 0.1 mg/cm<sup>2</sup> and a current density of 150 mA/cm<sup>2</sup> (paragraph 38). Therefore, the electrode provides greater than 150 mA/cm<sup>2</sup> per 100µg/cm<sup>2</sup> of the area of the carbon nanotubes.

11. As well, Hampden-Smith discloses a membrane electrode assembly having a supported active species (platinum electrocatalyst) loading of 0.1 mg/cm<sup>2</sup> and a current density of 150 mA/cm<sup>2</sup> (paragraph 38). Therefore, the electrode provides greater than 150 mA/cm<sup>2</sup> per 100µg/cm<sup>2</sup> of the area of the carbon nanotubes. Also, the reference teaches that the performance of the MEA is primarily judged by reference to the relationship between the cell potential and the current density (paragraph 279, Figure 10). The reference teaches that it is advantageous to achieve a higher current density at a higher voltage and to maximize cell performance at low platinum loading (paragraph 286).

12. Although the current density is not explicitly stated as greater than 10, 50, or 100 mA/cm<sup>2</sup> per µg/cm<sup>2</sup>, it would have been obvious to one having ordinary skill in the art at the time of the invention to optimize the performance of the MEA. See Claims 66-70 of

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the prior art. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shermanda L. Williams whose telephone number is (571) 272-8915. The examiner can normally be reached on Mon.-Thurs. 7 AM - 4:30 PM and alternating Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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**PATRICK JOSEPH RYAN**  
**SUPERVISORY PATENT EXAMINER**